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| APPLICATION NO.                  | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|----------------------------------|-------------|----------------------|---------------------|------------------|
| 10/586,598                       | 07/20/2006  | Tadashi Maeda        | 2006_1151A          | 1659             |
| 513                              | 7590        | 04/01/2011           | EXAMINER            |                  |
| WENDEROTH, LIND & PONACK, L.L.P. |             |                      | MEHTA, MEGHA S      |                  |
| 1030 15th Street, N.W.,          |             |                      | ART UNIT            | PAPER NUMBER     |
| Suite 400 East                   |             |                      |                     | 1734             |
| Washington, DC 20005-1503        |             |                      |                     |                  |
| NOTIFICATION DATE                |             | DELIVERY MODE        |                     |                  |
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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|                              |                        |                     |  |
|------------------------------|------------------------|---------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |  |
|                              | 10/586,598             | MAEDA ET AL.        |  |
|                              | <b>Examiner</b>        | <b>Art Unit</b>     |  |
|                              | MEGHA MEHTA            | 1734                |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

1) Responsive to communication(s) filed on 22 February 2011.

2a) This action is **FINAL**.                    2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

4) Claim(s) 16-39 is/are pending in the application.

4a) Of the above claim(s) 16-26 is/are withdrawn from consideration.

5) Claim(s) \_\_\_\_\_ is/are allowed.

6) Claim(s) 27-39 is/are rejected.

7) Claim(s) \_\_\_\_\_ is/are objected to.

8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All    b) Some \* c) None of:

1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

|  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ .                                    |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ .  | 6) <input type="checkbox"/> Other: _____ .                        |

## DETAILED ACTION

### Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 27-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,189,771 Maeda et al in view of US 2002/0185309 Imamura et al and further in view of US 6,680,128 Mei in view of US 5,837,119 Kang et al.

Regarding claim 27, Maeda teaches a soldering process with which a first electrode having a solder portion **9** thereon is soldered to a second electrode **1** (column 1, lines 13-16), wherein the process comprises, a first step of supplying a flux (in **5**) to at least one of the solder portion and the second electrode (column 4, lines 1-8), a second step of aligning the first electrode with the second electrode so as to locate the flux between the solder portion and the second electrode (column 5, lines 26-28), a third step of heating so as to melt the solder portion, so that a molten solder material from the solder portion comes in contact with the second electrode (column 5, lines 32-35). Maeda does not explicitly teach the fourth step of solidifying the molten solder material after the third step. However, this would have been obvious to one of ordinary skill in the art at the time of the invention because the purpose of solder is to adhere two pieces together and a liquid solder would not suffice.

Maeda additionally does not teach the flux composition.

Imamura teaches a method of mounting an electronic component with solder bumps to a substrate by using a flux that comprises a liquid base material **118** comprising a resin component which is dissolved in a solvent (paragraph 0066), an active component which removes an oxide (paragraph 0066), and a metal powder **116** made of a metal of which melting point is higher than that of a solder material which forms the solder portion **112** (paragraph 0064), where the flux contains the metal powder in an amount in the range between 1% and 9% by volume based on a volume of the flux (paragraph [0078]). It would have been obvious to one of ordinary skill in the art to include the flux of Imamura in the method of Maeda because one may vary the flux composition based on the desired final result and the effect of the flux on the product being made.

Neither Maeda nor Imamura teaches that the metal powder is in the form of scales. Kang teaches a method of creating a highly conductive paste for use in electronic applications. Kang teaches that the powder in the conductive paste is preferably plate of flake-shaped (column 5, lines 35-40). Kang does not teach that this powder is a constituent of the flux; it is in the solder. However, as known in the art and taught by Mei, it is common to include a solder material in the flux material such that the application process is simplified into a single step. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include the flake-shaped powders of Kang in the solder paste of Mei because this produces a better electrical connection with a minimum of filler material (column 5, lines 35-40). Mei also teaches that the solder may be mixed into the flux, forming a solder paste (column 5, lines 13-15). In this way, the flake-shaped metal particles are in the solder, which is in the flux; the metal particles are in the flux.

Regarding claim 28, Maeda teaches the solder portion is a bump which is formed on the first electrode (column 5, lines 15-22).

Regarding claim 29, Maeda teaches that the first electrode is an external connection electrode of an electronic part (column 5, lines 15-22).

Regarding claim 30, Maeda teaches that the second electrode is an electrode of a circuit formed on a substrate.

Regarding claim 31, Maeda teaches supplying the flux carried out in a flux application step wherein a film of the flux is formed, and then a lower end portion of the solder portion is made in contact with the film (column 4, line 58 – column 5, line 1 and figure 4A).

Regarding claim 32, Maeda teaches the soldering process but does not explicitly teach a cooling step. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to solidify the molten solder material through a cooling step wherein the molten solder material is cooled because cooling and thus solidifying the solder is the only way for the solder to hold two pieces together.

Regarding claim 33, Maeda in view of Imamura teach the majority of the limitations with respect to claim 27 above. Neither Maeda nor Imamura teaches a metal powder in the form of scales of which constituting elements are comprised of cores and coatings around the cores, wherein the coatings are made of a metal of which melting point is higher than that of a solder material which forms the solder portion.

Mei teaches a method of making a solder paste where the solder paste may be used in any application, including the bonding of electronic components. Mei teaches that the solder composition is preferably a metal alloy of tin coated with silver (column 2, lines 19-22),

where the tin is the core and the silver is the coating around the core. Mei further teaches that the coatings are made of a metal which has a melting point higher than that of a solder material which forms the solder portion (column 5, lines 12-13). Mei does not teach that these metal particles are particles in the flux. Instead, Mei teaches that the particles are in the solder. However, Mei also teaches that the solder may be mixed into the flux, forming a solder paste (column 5, lines 13-15). In this way, the metal particles are in the solder, which is in the flux; the metal particles are in the flux.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the cores and coatings around the cores of Mei in the method of Maeda and Imamura because this improves the wettability characteristics and shelf life of the solder paste (column 2, lines 14-18).

Mei does not teach that the particles are scale-shaped. Kang teaches a method of creating a highly conductive paste for use in electronic applications. Kang teaches that the powder is preferably plate of flake-shaped (column 5, lines 35-40). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the flake-shaped powders of Kang in the solder paste of Mei because this produces a better electrical connection with a minimum of filler material (column 5, lines 35-40).

Regarding claims 34, Maeda teaches the solder portion is a bump which is formed on the first electrode (column 5, lines 15-22).

Regarding claim 35, Maeda teaches that the first electrode is an external connection electrode of an electronic part (column 5, lines 15-22).

Regarding claim 36, Maeda teaches that the second electrode is an electrode of a circuit formed on a substrate.

Regarding claim 37, Maeda teaches supplying the flux carried out in a flux application step wherein a film of the flux is formed, and then a lower end portion of the solder portion is made in contact with the film (column 4, line 58 – column 5, line 1 and figure 4A).

Regarding claim 38, Maeda teaches the soldering process but does not explicitly teach a cooling step. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to solidify the molten solder material through a cooling step wherein the molten solder material is cooled because cooling and thus solidifying the solder is the only way for the solder to hold two pieces together.

Regarding claim 39, Mei teaches that the solder composition is preferably a metal alloy of tin coated with silver (column 2, lines 19-22), where the tin is the core and the silver is the coating around the core. “[M]ade of” is broadly interpreted as “comprising”.

### **Double Patenting**

3. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In*

re Goodman, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); In re Longi, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); In re Van Ornum, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); In re Vogel, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and In re Thorington, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

4. Claims 27, 33 and 39 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 4-6 of copending Application No. 10/585,729. Although the conflicting claims are not identical, they are not patentably distinct from each other because the differences between the two claims are as follows:

a. Claim 27 does not require the limitation of a metal particle with a core and a coating around the core. However, as the claim recites “comprises”, this limitation is not excluded from being present. As claim 33 includes the limitations of claim 27 and presents additional limitations, the remainder of the differences will be addressed with respect to claim 33 with the understanding that they apply to claim 27 as well.

b. Claim 33 recites "a first step of supplying a flux". However, it would have been obvious to one of ordinary skill in the art at the time of the invention to include the flux of the instant invention in the method of 10/585,729 because fluxes are well known in the art for their usefulness in cleaning surfaces prior to bonding such that the bond to be formed is superior in its integrity to a bond formed on a surface that has not been cleaned.

c. Claim 33 recites "wherein the coatings are made of a metal which has a melting point higher than that of a solder material which forms the solder portion". However, as evidenced by claim 6 in 10/585,729 compared to claim 39 of the instant application, the silver coating/tin core structure of the instant application is the same silver coating/tin core intended in 10/585,729. Therefore, this inherent property of silver having a higher melting temperature than tin would necessarily be present in 10/585,729. Furthermore, claim 4 of 10/585,729 also recites "comprising" such that this limitation is not excluded from the claim.

d. Claim 4 recites "wherein the solder portion easily wets and spreads along the surface metal when the solder portion is fluidized". However, this limitation would be obvious to one of ordinary skill in the art at the time the invention was made because solder is used to join two objects. Being easily wettable and spreading along the surface are requirements in order for the solder to function as it should. Solder that is not easily wettable often creates defects in the final product due to insufficient bonding.

- e. Claim 4 recites “1-20 vol%” regarding the amount of metal powder in the soldering paste. However, the instant application recites 1-9 vol%, which is encompassed by 1-20 vol%.
- f. Claim 4 recites, “in the step (c), the surface of the core metal is exposed at a portion of the metal powder which is not in contact with the molten solder, while the surface metal is taken into the core metal by dissolution.” However, as the soldering method of the instant invention is not structurally indistinguishable from that of 10/585,729, it would be reasonable to expect that the soldering material of the instant invention would also exhibit an exposed core not in contact with the molten solder while the surface metal is taken into the core metal by dissolution. Moreover, the instant invention recites “comprises” such that this limitation is not excluded from being present.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

5. Claims 27, 33 and 39 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1 and 2 of U.S. Patent No. 7,632,710. Although the conflicting claims are not identical, they are not patentably distinct from each other because the differences between the two claims are as follows:

- a. Claim 27 does not require the limitation of a metal particle with a core and a coating around the core. However, as the claim recites “comprises”, this limitation is not excluded from being present. As claim 33 includes the limitations of claim 27 and

presents additional limitations, the remainder of the differences will be addressed with respect to claim 33 with the understanding that they apply to claim 27 as well.

b. Claim 33 recites “a first step of supplying a flux”. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to include the flux of the instant invention in the method of 7,632,710 because fluxes are well known in the art for their usefulness in cleaning surfaces prior to bonding such that the bond to be formed is superior in its integrity to a bond formed on a surface that has not been cleaned.

c. Claim 33 recites “wherein the coatings are made of a metal which has a melting point higher than that of a solder material which forms the solder portion” while claim 1 recites “including a core segment of the metal molten at a higher temperature than the liquid phase temperature of solder”. However, as evidenced by claim 2 in 7,632,710 compared to claim 39 of the instant application, the silver coating/tin core structure of the instant application is the same silver coating/tin core intended in 10/585,729. Therefore, this inherent property of silver having a higher melting temperature than tin would necessarily be present in 7,632,710. It is understood that the recitation of claim 1 is incorrect.

d. Claim 1 recites “a surface segment of the metal with good wettability for said solder molten to be solid-solved in said core segment molten”. However, this limitation would be obvious to one of ordinary skill in the art at the time the invention was made because solder is used to join two objects. Being easily wettable and spreading along the surface are requirements in order for the solder to function as it

should. Solder that is not easily wettable often creates defects in the final product due to insufficient bonding. Furthermore, as the soldering method of the instant invention is not structurally indistinguishable from that of 7,632,710, it would be reasonable to expect that the soldering material of the instant invention would also exhibit an exposed core not in contact with the molten solder while the surface metal is taken into the core metal by dissolution. Moreover, the instant invention recites “comprises” such that this limitation is not excluded from being present.

### **Response to Arguments**

6. Applicant's arguments filed February 22, 2011, have been fully considered but they are not persuasive. Applicant argues that it would not have been obvious to include the scales of Kang in the solder paste of Mei because Kang uses copper. However, the Examiner never suggested a modification of Mei's solder composition. Only the shape of the material was modified. The method of and reason for making scale-shaped metal particles was imported from Kang into Mei because of the teaching from Kang that scale-shaped particles produce a better electrical connection.

7. Applicant further argues that Kang's scale-shaped particles are meant to maintain their shape and not melt in the reflow process, unlike that of the present invention. However, the particular use or reason for employing a method is not relevant to the issue presented. Whether or not Kang wanted his scale-shaped particles to melt does not bear on the fact that Kang's scale-shaped particles in the solder paste of Mei reads on the claim. Further, because Mei discloses tin coated with silver, tin scales with a silver coating on them would melt

during the reflow process and produce conductive paths such as those shown in the drawing of the present invention on page 5 of the Arguments.

8. The double patenting rejections are maintained.

### **Conclusion**

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MEGHA MEHTA whose telephone number is (571)270-3598. The examiner can normally be reached on Monday to Friday 8:30 am to 5:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Emily Le can be reached on 571-272-0903. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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